

An Exploratory Analysis of Vertical Ground Reaction Forces During Jump Landing in Pediatric Patients Following Anterior Cruciate Ligament Reconstruction

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BACKGROUND: The rate of anterior cruciate ligament (ACL) rupture and reconstruction (ACLR) in pediatric patients has increased over the last decade. Jump performance tests are often implemented to test readiness for return-to-sport following ACLR. Adults demonstrate greater peak vertical ground reaction forces (vGRF) during jump-landing in comparison to healthy controls, which is linked to greater risk of reinjury and knee dysfunction. **PURPOSE:** The study purpose was to determine: (1) the between-limbs effect sizes for pediatric patients (defined as Tanner Stage I-IV) and pediatric uninjured controls; (2) between-group effect sizes for the ACLR limb of pediatric patients and the dominant limb of pediatric controls, and separately, for the ACLR limbs of pediatric and adult ACLR patients. **METHODS:** Participants performed a countermovement jump from a 30 cm box onto two force plates. Kinetic data was collected at 1050Hz and lowpass filtered at 10 Hz (4th order recursive Butterworth). vGRF was averaged from 4 jumping trails and normalized to body weight. **RESULTS:** Pediatric ACLR patients demonstrated a small between-limb effect size (Injured= 2.16 ± 0.63 vs. Uninjured= 2.11 ± 0.53 ; $g=0.08$) while a large effect size was observed between-limbs in pediatric controls (Dominant= 2.85 ± 0.58 vs. Nondominant= 2.65 ± 0.21 , $g=0.88$). Pediatric ACLR patients (2.16 ± 0.63) exhibited a large effect size compared to pediatric controls (2.856 ± 0.584 ; $g=-1.35$) and a small effect size in comparison to adult ACLR patients (2.64 ± 1.06 ; $g=-0.45$). **CONCLUSION:** Peak jump landing vGRF magnitudes may vary with sexual maturation and future studies should consider the impact of jump landing performance on long-term outcomes in pediatric ACLR patients.

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